

Application No. 10/750,522  
Response to Office action of November 8, 2007

Att. Docket No. 042390.P16465  
TC/A.U. 2823

### Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Cancelled) An optical modulator device comprising:  
a substrate formed from a semiconductor material;  
an optically active layer formed on an upper surface of the substrate, the optically active layer including a layer of SiGe having a quantum well to provide electro-absorption of light in the optically active layer;  
a layer of semiconductor material formed on an upper surface of the optically active layer; and  
an electrical contact formed on an upper surface of the layer of semiconductor material to provide an electric field to alter the electro-absorption of light in the optically active layer.
  
2. (Currently Amended) ~~The device of claim 1~~ An optical modulator device comprising:  
a substrate formed from a semiconductor material;  
an optically active layer formed on an upper surface of the substrate, the optically active layer including a layer of SiGe having a quantum well to provide electro-  
absorption of light in the optically active layer, wherein the layer of SiGe comprises a layer of SiGe nanocrystals;  
a layer of semiconductor material formed on an upper surface of the optically active layer; and

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an electrical contact formed on an upper surface of the layer of semiconductor material to provide an electric field to alter the electro-absorption of light in the optically active layer.

3. (Currently Amended) The device of claim 1, wherein the layer of SiGe is a strained layer of SiGe having a dopant to provide electrons in the strained layer of SiGe.
4. (Original) The device of claim 3, wherein the dopant is at least one of arsenic, phosphorus, and antimony.
5. (Original) The device of claim 3, wherein the strained layer of SiGe is between 20 and 70 percent Germanium.
6. (Original) The device of claim 5, wherein the strained layer of SiGe is 27 percent Germanium.
7. (Original) The device of claim 3, wherein the substrate is formed from silicon.

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8. (Original) The device of claim 3, further comprising:  
a second layer of semiconductor material formed on an upper surface of the substrate; and  
wherein the optically active layer is formed on an upper surface of the second layer of semiconductor material.
9. (Original) The device of claim 8, wherein the second layer of semiconductor material is formed from silicon.
10. (Original) The device of claim 3, wherein the optically active layer further comprises:  
a layer of semiconductor material formed on an upper surface of the first strained layer of SiGe; and  
a second strained layer of SiGe formed on an upper surface of the semiconductor layer to provide a second quantum well, wherein the second strained layer of SiGe is doped with arsenic.
11. (Original) The device of claim 10, wherein a ratio of silicon to germanium in the first strained layer is different than a ratio of silicon to germanium in the second strained layer.

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12. (Currently Amended) The device of claim 1, wherein the optical modulator is an optical waveguide modulator.

13. (Original) The device of claim 12, further comprising an optical cavity in optical communication with the optically active layer.

14. (Currently Amended) The device of claim 1, wherein the layer of SiGe has a thickness between five and thirty nanometers.

15. (Currently Amended) The device of claim 1, wherein the substrate is formed from germanium.

Claims 16-30 (Withdrawn)

31. (Cancelled) An integrated circuit comprising:  
a substrate formed from a semiconductor material;

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an optical modulator with an optically active layer formed on the semiconductor substrate, the optically active layer including a strained layer of SiGe having a quantum well to provide electro-absorption of light; and  
an optical fiber having a first end in optical communication with the optical modulator.

32. (Currently Amended) ~~The system of claim 31~~ An integrated circuit comprising:  
a substrate formed from a semiconductor material;

an optical modulator with an optically active layer formed on the semiconductor substrate, the optically active layer including a strained layer of SiGe having a quantum well to provide electro-absorption of light, wherein the strained layer of SiGe is doped with at least one of arsenic, phosphorus, and antimony; and

an optical fiber having a first end in optical communication with the optical modulator.

33. (Original) The system of claim 32, further comprising a light-emitting source fabricated on the semiconductor substrate to provide an optical signal to the optical modulator.

34. (Original) The system of claim 33, further comprising a photodetector in optical communication with a second end of the optical fiber to receive light.

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35. (Currently Amended) The system of claim ~~31~~ 32, wherein the substrate is formed from silicon.

36. (Original) The system of claim 35, wherein the strained layer of SiGe is between 20 and 70 percent Germanium.

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